

Colorado Department of Health
Hazardous Materials & Waste Management Division

Comments

on

Draft Final

TECHNICAL MEMORANDUM NO.1

FOR

PHASE I RFI/RI of OU-7

HUMAN HEALTH RISK ASSESSMENT EXPOSURE SCENARIOS

January 15, 1993

- =====
- 1) Sections 2.5.2 and 2.6.3 The statements that sandstones may not subcrop beneath the East Landfill Pond (page 2-19) and that the pond does not directly discharge surface water to the drainage downgradient (page 2-24) are preliminary. Conclusions on these subjects could be reached after the current OU7 investigations have been completed. The first statement (page 2-19) should be specifically referenced.
 - 2) Section 3.0 The DOE 1990 reference cited throughout this section of the document uses 1980 census data. Census data for 1990 has been available for some time and should be incorporated into this document.
 - 3) Section 3.1 Again, using a 1989 population projection from 1980 data is not acceptable. In addition, the estimate of zero population growth in the area immediately adjacent to the plant boundary is highly suspect given the change in plant mission.
 - 4) Section 3-1 A map should be provided showing the locations of the schools, hospitals and nursing homes within a 10 mile radius of RFP, which are mentioned on page 3-4.
 - 5) Figure 3-1 This figure should be updated to reflect 1990 census data.
 - 6) Figure 3-2 This figure should be updated to show projections which reflect 1990 census data.
 - 7) Table 3-1 This table should be updated to reflect 1990 census data.

A-OU07-000175

8) Figure 3-3 This map is not readable and therefore is of little use.

9) Section 3.2.1 The last sentence on the bottom of page 3-4 should be changed to read "The northeastern Jefferson County and RFP area includes one of the most . . ."

10) Table 3-2 The zoning code "M-C" should be explained on page 3-11 following this table.

11) Section 3.2.2 Industrial land-use will probably not "dominate" future land-use in northeastern Jefferson county as stated in the first paragraph, particularly given the plant mission change and the pace of residential development in the area.

12) Section 3.2.2 The third and fourth paragraphs in this section do not accurately represent the facts. W-470 is no longer an issue since this project is currently defunct, only a small percentage of the area is industrial, zoning does not allow for heavy industry, and the plant's mission has changed.

13) Section 3.2.2 The third paragraph on page 3-4 uses outdated information from the same report (DOE, 1990) mentioned earlier. Plant mission and community perceptions have changed.

14) Section 3.2.2 The last paragraph in this section is also inaccurate. Current land use in the immediate vicinity of RFP is not primarily commercial/industrial. It is predominantly low density agricultural and residential which can be seen on the land use map and Table 3-2 in this document.

15) Section 3.3.2 On page 3-17, the text states that "use of onsite production facilities by private industry is planned for the future at RFP." This issue should be revisited in light potential changes brought about by the new administration and new Energy Secretary. Also, there are many inherent problems with private industry using portions of RFP that DOE has been unable to coherently address at this time.

The Rocky Flats Local Impacts Initiative (RFLII) is not "working to achieve" private industry use of RFP. They are evaluating this as one option to minimize economic impacts to the surrounding communities from the changing plant mission.

Issues raised in this section should be clarified by knowledgeable DOE sources. This information should not be coming from the cited sources (*Denver Post*, *Boulder Daily Camera*, RFLII).

16) Section 3.3.2 At the top of page 3-18, it states that the buffer zone is being considered as a potential ecological preserve. What the text does not state, but needs to, is that this is only one of several potential uses under consideration. In light of the

mission change, many more land use options have become viable.

17) Section 3.3.2 The paragraph at the middle of page 3-18 states that extensive development of the area is unlikely. Again, mission change has made this statement less certain.

18) Section 3.3.2 The final sentence of this section is entirely wrong for the previously stated reasons.

19) Section 3.4 The first paragraph in this section states that "EPA guidance does not require an exhaustive assessment of every potential receptor and exposure scenario". While this may be true, all potential receptors must still be identified and compared to determine the likelihood of harm.

20) Section 3.4 Future on-site residential uses are not inconsistent with planned off-site industrial and commercial development. The RFP buffer zone is very large and could easily allow both residential and industrial/commercial land-uses to co-exist. Residential developments are the predominant land-use off-site and are increasingly encroaching on the immediate borders of the buffer zone. The Standley Lake-Louisville-Superior residential area is one of the fastest growing portions of the Denver-Metro area. Water resources are presently not a limiting factor for development and are not anticipated to be in the future. Given the change in plant mission, future on-site residential developments are no longer "improbable". Whether residential land-use is consistent with outdated DOE plans is no longer relevant.

21) Section 3.4 The paragraph beginning in the middle of page 3-21 states that "future offsite agricultural land uses are identified as plausible", but the rest of the sentence is inconsistent with that statement. In exposure scenario technical memoranda for other OUs, this sentence is finished by stating "although such an activity is expected to decrease in the future."

22) Section 3.5 The proposal to aggregate data on an operable unit basis rather than an IHSS specific basis (bottom of page 3-22) is unacceptable since it precludes consideration of hot spot exposures as required by RAGS. IHSSs should be evaluated separately so that any contamination at each site can be dealt with more effectively. If data from hotspots is combined with that from potentially uncontaminated areas in OU7, potential contaminants could be "diluted out", and the resulting risk would be underestimated.

23) Table 3-4 Section 3.3.1 on page 3-16 states that, "Current activities within OU7 include environmental investigations and routine security surveillance". However, Table 3-4 indicates that current ecological reserve land use scenarios will not be considered. What is the justification for not including a current ecological researcher scenario? This scenario would likely bound

the current security guard because more hours would be spent on OU7. The argument that current health and safety practices preclude considering current occupational scenarios is not valid.

24) Table 3-4 If current offsite agricultural land use is expected to bound current offsite residential land use as is stated in footnote "c", then why is the residential scenario indicated as "retained for quantitative evaluation" in this table, but not agricultural land use? Section 3.2.1 lists agriculture as a current land use and mentions cattle herds near Rocky Flats Plant. This scenario is considered "plausible" in the future (see Table 3-3). Why hasn't an off-site agricultural family scenario been quantitatively evaluated? Assumptions made under the worker or residential scenarios may not apply to people who live on agricultural property because of differences in length of workday, seasonal changes in work habits, etc. Guidance for exposure parameters to use when considering this scenario are in EPA, 1991 (OSWER Directive 9285.6-03). Footnote "h" makes an invalid conclusion. See Comment 21 above.

25) Table 3-4 Footnote "f" assumes no growth in offsite residential land use. As stated in several previous comments, this assumption is invalid. Even if it could be shown that footnote were valid, it will be useful to quantitatively evaluate a future offsite residential. The remedies and controls that could be applied to correct potential onsite residential exposure might not be effective in correcting future offsite residential exposure.

26) Figure 3-7 The receptors listed in the legend should be expanded to include those mentioned in comments above. An exposure point for future off-site residents should be added at a point located on the predominant wind vector emanating from OU 7.

27) Section 3.5.1 Simply because current workers are monitored and protected by current health and safety programs does not mean that current environmental or construction worker scenarios should not be evaluated. Construction workers are exposed to subsoil and possible health risks from that media need to be evaluated.

28) Section 3.5.3 DOE has chosen to evaluate a future onsite worker exposure scenario which does not include a future construction worker. In Section 4.5.2.3 a future onsite office worker is chosen to represent this exposure scenario. Some justification for ignoring the future construction worker and evaluating only the future office worker should be made in the text. This restrictive choice will be acceptable only if the future onsite office worker scenario can be shown to bound the construction worker scenario. The construction worker scenario provides a way to look at more acute exposures via ingestion or dermal contact with subsurface soil and inhalation of soil vapors and dust due to excavations. Section 6.4.2 of "Risk Assessment Guidance for Superfund" (RAGS) recommends that exposure to high

concentrations such as occur at hot spots "should be determined for the shortest period of time that could produce an effect." The potential acute hazards (e.g., to VOCs from soil gas) which current landfill workers or future construction workers face should be evaluated as well as the longterm hazards. In addition, exposure to subsoil must be considered for both the construction worker and the landfill worker.

29) Section 4.5 The difference between "direct contact" and "wind-blown" routes of exposure is not adequately explained until page 4-12. The conceptual site model, as portrayed in Figure 4-1, would be more clearly understood if this explanation came earlier in the text.

30) Section 4.5.1 The assumption that "concentrations of radioactive material at or under the surface of the landfill are [not] sufficient to cause significant external exposures from fugitive dust" (p. 4-6) must be justified. The statement ignores documented releases of radioactive materials and precludes any future excavation at the site. The data DOE used to reach this conclusion must be made available for CDH to review before we can agree that external radiation from wind suspension and subsequent deposition does not need to be quantified.

31) Section 4.5.2.1 The argument in Comment 10 also applies to chemicals bound to windblown soil. The assumption on page 4-8 that "secondary exposure to soils following wind deposition of particulates is negligible relative to direct exposures to site soils" must be justified. Until supporting data is made available for review, CDH cannot approve this statement.

32) Section 4.5.2.2 In the discussion of mechanisms of plant uptake at the bottom of page 4-9 and the top of page 4-10, DOE must consider plant uptake from wind deposition of metals and organic chemicals as well as surface contamination of plant vegetation. DOE's use of the EPA 1991a reference (Baseline Risk Assessment for California Gulch at Leadville) is misapplied. This risk assessment deals primarily with arsenic, lead, and cadmium. Other metals or chemicals may not bind as tightly to soils as these metals can. In addition, Leadville is in the mountains, with very different soil-types and conditions than those at Rocky Flats, which is at the edge of the foothills. Plant uptake of chemicals from the soil is very site and soil-type specific because a number of physico-chemical factors can influence this process. Solubility, dissociation or speciation in water, soil-sorption coefficients, cation-exchange ratios, reactivity, including oxidation, reduction, complexation and precipitation all are very dependent on specific site conditions such as pH, organic content of the soil, moisture, etc. Moreover, plant uptake can be both passive (nonmetabolic) and active (metabolic). Active uptake especially of metals can occur against concentration gradients and regardless of how tightly the chemical is bound to the soil. In addition, the ability of

different plants to absorb chemicals varies widely depending on the particular environment (Trace Elements in Soils and Plants, A. Kabata-Pendias and H. Pendias, CRC Press, Boca Raton, FL, 1985). Therefore, plant uptake from soil as well as surface contamination of plant vegetation should be considered quantitatively for both offsite residential exposures and onsite exposures.

33) Section 5.0 CDH does not agree with the idea on page 5-2 that "Because contact rates (except for soil ingestion) are approximately proportional to body weight, child residential intakes are not estimated separately for any exposure pathway except soil ingestion, for which children are assumed to have higher daily intake rates." Inhalation exposures are a case in point. Total deposition of air particles in the respiratory tract for children is higher than that for adults (Xu and Yu, *Aerosol Science and Technology*, 5:349-357, 1986). Moreover, children are often the more sensitive populations to a given chemical effect. Therefore, DOE must quantitatively estimate child residential exposures for all exposure pathways, not just for soil ingestion.

34) Section 5.1.1 Although landfill workers were temporarily on a 3-day/week schedule, they are now at the landfill 5 days a week. This more conservative value should be used for the RME exposure frequency for the current onsite worker.

35) Section 5.1.1 Depending upon the research project, it is likely that an ecological researcher could work all year long. A 16-week field season is not realistic and not acceptable. Also, the 7-year exposure duration for an ecological researcher used in the intake factor calculations should be listed here if it can be justified. Footnotes in the tables say this number is "based on guidance provided by IAG members." Please reference this guidance.

36) Section 5.1.1 The RME exposure duration for the current landfill worker was assumed to be 5 years based on the assumption that the landfill will be closed within this period. However, this estimate does not take into account how long the landfill will have to be monitored after closure. Five years is not acceptable; use 25 years instead.

37) Section 5.1.2 The assumption on page 5-4 that 25% of inhaled particles are deposited in the lung per se is true. However, deposition can also occur in other parts of the respiratory tract and exert health effects. Moreover, the same table in the same study that the 25% came from also states that 50% of inhaled particles are deposited in the upper respiratory passages and subsequently swallowed and retained in the body (MRI, 1985). Because baseline risk assessments are concerned with overall health effects of inhalation and not simply lung effects, the usual value used for depositional fraction is 75%. A wide variety of sources indicate that 25% is too low a value for depositional fraction. These include the soil dust inhalation estimates of Hawley (Risk

Analysis 5:(4)289-302, 1985), the International Commission on Radiological Protection (ICRP,1980) study which states that for aerosols with a mean aerodynamic diameter between 0.2 um and 20 um, the sum of the fractions deposited in the three regions of the respiratory tract varies from about 60% to 90%, and the US EPA's "Second addendum to air quality criteria for particulate matter and sulfur oxides (1982)",(EPA600/8-86-020f). If applied at all, a value of 75% is recommended.

38) Section 5.1.2 (Page 5-4) Any chemical-specific inhaled VOC values for lung retention obtained from the literature must be reviewed and approved by CDH before they can be used. What values will be used if no values can be obtained from the literature? What criteria will be used to evaluate the validity of any literature values?

39) Section 5.1.3 Fraction ingested (FI) factors, as described on page 5-5, should not be used. The calculation for the future onsite ecological researcher scenario is based on area, not time, and is therefore unacceptable. Depending on the research project, it is entirely conceivable that an ecological researcher could spend the vast majority of time in one area like OU7 or a small portion of OU7. Averaging the exposure over the whole RFP buffer zone will essentially dilute out any exposure and is not protective in the remotest sense. In addition, RAGS (6.6.2) suggests that concentrations in indoor dust can be equal to outdoor dust, and therefore the FI should be equal to 1, not 0.5 for the residential scenario.

40) Section 5.1.3 Soil matrix values should not be used to modify soil ingestion exposures. The overall usefulness of soil matrix values and the availability of appropriate site-specific and chemical-specific values in the literature are questionable.

41) Section 5.1.4 (Page 5-6) A 4-month harvesting season and exposure duration will underestimate potential exposures to contaminated homegrown produce. People not only eat fresh produce, but preserves as well, even in this modern age. A 12-month exposure frequency for homegrown produce should be used instead of a 4-month period.

42) Section 5.1.4 This discussion of homegrown produce ingestion should include fruit as well as vegetables.

43) Section 5.1.4 The discussion on page 5-7 of matrix effect on produce bioavailability is unclear. It is not likely that the chemical-specific matrix effect values used for absorption of chemicals to soil will be the same as those for absorption of chemicals to vegetable matter. If this is what was meant, it is unacceptable.

44) Section 5.1.5 The surface area (2910 cm²) used for the future

ecological researcher and for the future adult resident is too low. It is not reasonable that especially the resident would expose only the face, forearms and hands (15% of the total body surface). Use the standard default values of 5800 cm² for the residential RME. The use of 2910 cm² surface area for the future ecological researcher probably will underestimate the extent of exposure since it has been shown that some chemicals can permeate through clothing (Dermal Exposure Assessment: Principles and Applications, EPA/600/8-91/011B, 1991).

45) Section 5.1.5 (Page 5-8) If no data on the percent of specific organic compounds absorbed through the skin is available in the literature, what will be the default values?

46) Section 5.1.5 (Page 5-8) OSWER directive 9285.6-03 states that exposure parameters such as the average inhalation rate of 20 m³ /day are based on people such as housewives, retired people, invalids, and young children who spend the majority of their time at home. Therefore, 16 hours spent at home would underestimate the exposures to this population. Moreover, these groups make up the more susceptible portions of the general population. Thus CDH recommends that the fraction contacted (FC) from the contaminated medium be changed from 0.5 for the current and future residential receptors to protect these susceptible populations. The same arguments detailed in Comment 18 above for the FI apply to both the future onsite ecological researcher and the residential receptors. The FC values listed here for these two receptors are not acceptable.

47) Tables 5-1 - 5-21 The averaging time used for noncarcinogenic chemicals should be equal to product of the exposure frequency (days/year) and the exposure duration (years). All the averaging times listed in these tables should be checked and corrected if necessary.

48) Tables 5-1 - 5-5 The various factors used in these tables to reduce RME values are generally unsupported assumptions. Several techniques have been used to "fine-tune" estimates of time spent at the site. The adjustment for snowcover assumes that one inch of snow eliminates all possibilities of dermal contact with soil, soil ingestion, irradiation, etc. The assumption that residents spend only 16 hours/day at home is not supportable by any data. It also does not take the more susceptible populations such as the elderly, invalids, and young children who are more likely to stay at home most of the time into account. Similarly, attempts at determining fractional intake, or limiting homegrown vegetable consumption to 4 months/year are merely assumptions, not supported by any data. Other adjusting factors such as deposition factor (Comment 17), fraction ingested factors (Comment 19), and soil matrix values (Comment 20) have been mentioned above. If any of these factors are applied to the RME values, then an unadjusted RME value must also be reported so that the effect of these adjustments can be

evaluated.

49) Tables 5-1 - 5-21 These tables do not include calculations for the current offsite resident, although that scenario was selected in Section 4 (see Table 4-1) to be quantitatively evaluated.

50) Tables 5-1 - 5-21 These tables should be revised to reflect the appropriate modifications requested in Comments 13, 14, 15, 16, 17, 19, 20, 21, 24, 25, 26, 27, 28, and 29.